Climate Data Set Development and Analysis

Information Sheet FY 2009

C^2D^2activities have historically focused on ensuring the availability of high-quality data sets for evaluating the significance of climate variability and change, a fundamental cornerstone to our understanding and, ultimately, prediction of climate. In developing data sets, however, there are a variety of uncertainties that will impede analyses unless directly addressed during the development phase. Examples of areas of uncertainty that C^2D^2 explicitly addresses in the research mode include: changes in station location and in the environment around an observation site; changes in instruments and algorithms; instrument malfunctions, instrument calibrations and biases; inadequate spatial resolution, data set length, or temporal resolution; changes in temporal and spatial sampling, and aliased temporal sampling; and data assimilation and model reanalysis biases. During FY 2009, C^2D^2 is emphasizing the need to address these issues of data set homogeneity and continuity when preparing proposals. This attention to the scientific integrity of a data set helps prevent erroneous results from being published in national and international assessments.

The C^2D^2 focus is on data sets of primary importance to climate change (e.g., tropical storm climatology over the various ocean basins; extratropical storms; sea surface temperature; ocean heat content; sea level; precipitation; water vapor, etc) that would benefit from additional data assemblage (the incorporation/merging of data derived from multiple sensors/platforms), the development of innovative quality control procedures to insure data homogeneity, and data bias identification/adjustment work. The purpose of this program is not to perform the initial (zero-order) quality control of the raw data coming from a new instrument or recent field campaign but to generate best estimates of a climate variable over time. The emphasis is on data compilations that have the potential to become enduring data sets relevant to long-term monitoring and climate change studies because of their length, continuity, and consistency. As new (or newly discovered) data become available, analysis techniques improve, instruments and measurement practices change, or data set deficiencies are identified, it is important to re-visit existing data sets and reprocess them, as appropriate.

Guidance on selecting high priority climate variables can be found in the GCOS Second Adequacy Report (2003), which defines a set of Essential Climate Variables, and, also, in the 2008 report on "Future Climate Change Research and Observations: GCOS, WCRP and IGBP Learning from the IPCC Fourth Assessment Report" (WMO/TD No. 1418), which identifies current gaps and shortcomings in observations, data sets, and research, as well as several relevant Climate Change Science Program (CCSP) Synthesis and Assessment Products (SAPs), e.g., SAP 1.1 and SAP 3.3 (http://www.climatescience.gov/Library/sap/sap-summary.php).

Proposals are particularly encouraged for data sets that: (1) are long-term (recognizing that the duration of some key records is limited); (2) support the study of extreme weather and climate events (e.g., tropical storms, heavy downpours, floods, droughts,

heat waves, tornadoes, lightning, wildfires, etc.); and (3) involve the analysis of the data sets to understand whether and to what extent the character of the extremes is variable or changing. The temporal and spatial resolution must be sufficient to differentiate the regional signal from background noise. Extremes also include the natural modes of variability of the climate system (e.g., ENSO, PDO, NAO, etc.), which have linkages to the extreme events that are experienced at smaller space and time scales.

Proposers are encouraged to include a proposal component that reflects any plans to scientifically exercise the data sets to elucidate patterns of climate variability and change. This activity ultimately leads to a more robust data set and provides essential insights on how components of the climate system are variable or fundamentally changing.

TECHNICAL DETAILS

Proposals will be considered for up to three years in duration, but one and two year proposals are encouraged. Funds for each subsequent year of multi-year proposals will be subject to a review of annual progress reports.

Proposals are required to address the long-term preservation of the data set, i.e., have a plan to transfer responsibility for the archiving of the data set to a recognized national center in a format and with sufficient metadata to ensure a useful and accessible resource.